The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method of forming by chemical vapor deposition on a substrate an aluminide coating including a reactive element for a surface active substrate impurity element, comprising flowing a first halide precursor gas in a carrier gas in contact with a first source comprising aluminum disposed outside a coating retort to generate an aluminum halide first coating gas, flowing a second halide precursor gas in an inert carrier gas in contact with a second source comprising the reactive element disposed outside the coating retort to generate a second halide coating gas of said gettering element, and introducing the first and second coating gases concurrently into a coating retort in which the substrate at elevated temperature is disposed.

2. The method of Claim 1 wherein the first coating gas is formed by flowing hydrogen chloride in a hydrogen carrier gas in contact with Al particulates heated to a reaction temperature to form aluminum trichloride.

3. The method of Claim 1 wherein the second coating gas is formed by flowing hydrogen chloride in an inert carrier gas in contact with particulates selected from the group consisting essentially of Hf and Zr heated to a reaction temperature to form the tetratrichloride thereof.

4. The method of Claim 1 wherein the first coating gas is flowed in contact with said first source at a flow rate controlled to generate an aluminum halide coating gas while leaving a portion of the halide precursor gas unreacted and then flowing the unreacted

portion of the halide precursor gas in contact with a second source comprising silicon to cogenerate a silicon halide coating gas from said halide precursor gas.

5. The method of Claim 4 wherein the halide precursor gas is flowed through a generator reaction chamber having the source of aluminum therein proximate an inlet region of the chamber and the source of silicon therein proximate an outlet region of the chamber such that the halide precursor gas first contacts the source of aluminum and then contacts the source of silicon to generate a coating gas stream comprising aluminum halide and silicon halide.

6. The method of Claim 4 wherein the halide precursor gas is flowed through a first generator reaction chamber having the source of aluminum therein and then through a second generator upstream of said first generator and having the source of silicon therein such that the halide precursor gas first contacts the source of aluminum and then contacts the source of silicon to generate a coating gas stream comprising aluminum halide and silicon halide.

7. The method of Claim 1 wherein the second halide coating gas is flowed in contact with said second source at a flow rate controlled to generate a hafnium halide coating gas while leaving a portion of the halide precursor gas unreacted and then flowing the unreacted portion of the halide precursor gas in contact with a second source comprising zirconium to cogenerate a zirconium halide coating gas from said halide precursor gas.

8. The method of Claim 7 wherein the halide precursor gas is flowed through a generator reaction

chamber having the source of hafnium therein proximate an inlet region of the chamber and the source of zirconium therein proximate an outlet region of the chamber such that the halide precursor gas first contacts the source of hafnium and then contacts the source of zirconium to generate a coating gas stream comprising hafnium halide and zirconium halide.

9. The method of Claim 7 wherein the halide precursor gas is flowed through a first generator reaction chamber having the source of hafnium therein and then through a second generator upstream of said first generator and having the source of zirconium therein such that the halide precursor gas first contacts the source of hafnium and then contacts the source of zirconium to generate a coating gas stream comprising hafnium halide and zirconium halide.

10. A method of chemical vapor deposition on a substrate of first and second elements, comprising flowing a halide precursor gas in a carrier gas in contact with a first source comprising a first element disposed outside a coating retort to generate a first halide coating gas, flowing the first coating gas into the coating retort in contact with a second source comprising a second element disposed inside the coating retort to convert a portion of the first coating gas to a halide coating gas of the second element, and contacting the first and second coating gases concurrently with the substrate at elevated temperature in the coating retort to codeposit the first and second elements on the substrate.

11. A method of forming by chemical vapor deposition on a substrate an aluminide coating including a reactive element for a surface active substrate

impurity element, comprising flowing a halide precursor gas in a carrier gas in contact with a first source comprising aluminum disposed outside a coating retort to generate an aluminum halide coating gas, flowing the first coating gas into the coating retort in contact with a second source comprising the reactive element disposed inside the coating retort to convert a portion of the first coating gas to a halide coating gas of the reactive element, and contacting the coating gases concurrently with the substrate at elevated temperature in the coating retort to form an aluminide coating including the reactive element.

12. The method of Claim 11 wherein the source of the reactive element inside the coating retort comprises yttrium particulates.

13. A method of forming by chemical vapor deposition on a substrate an aluminide coating including a reactive element for a surface active substrate impurity element, comprising flowing a halide precursor gas in a carrier gas in contact with a first source comprising aluminum disposed outside a coating retort to generate an aluminum halide coating gas, flowing the first coating gas into the coating retort in contact with a second source comprising the reactive element disposed inside the coating retort to convert a portion of the first coating gas to a halide coating gas of the reactive element, flowing the unconverted portion of said first coating gas in contact with a secondary source comprising an aluminum alloy in the coating retort to increase the activity of aluminum therein, and contacting the coating gases concurrently with the substrate at elevated temperature in the coating retort to form an aluminide coating including the reactive element.

14. The method of Claim 13 wherein the source of the reactive element inside the coating retort comprises yttrium particulates.

15. The method of Claim 13 wherein the first coating gas comprises aluminum trichloride and wherein the activity of aluminum in the unconverted portion of the first coating gas is increased by forming subchlorides of aluminum trichloride by contact with said secondary source.

16. The method of Claim 15 wherein the secondary source comprises an Al-Cr or Al-Co alloy.

17. The method of Claim 13 wherein the first coating gas comprises aluminum trichloride and a tetrachloride of the reactive element formed outside the coating retort.

18. The method of Claim 17 wherein the first coating gas includes a tetrachloride of hafnium or zirconium formed outside the coating retort to form an aluminide coating including two or more reactive elements.

19. The method of Claim 17 further including introducing a silicon halide coating gas in the coating retort in a manner to by-pass the second source and concurrently contact the substrate with said coating gases to form an aluminide coating including Si and the reactive element.

20. A coated substrate comprising a superalloy substrate and a chemically vapor deposited aluminide diffusion coating thereon including at a coating region or throughout the coating a dispersion of a reactive

element for a surface active substrate impurity element by virtue of said reactive element being codeposited with aluminum on said substrate.

21. The coated substrate of Claim 20 wherein the reactive element is selected from the group consisting of Hf, Zr, Si and Y.

22. The coated substrate of Claim 21 wherein two or more reactive elements selected from the group consisting essentially of Hf, Zr, Si, and Y are dispersed in the coating by virtue of codeposition with aluminum on the substrate.

23. Apparatus for forming a chemical vapor deposition coating gas, comprising means for providing a halide precursor gas, means for flowing the halide precursor gas in contact with a first source comprising metal, coating retort means, and means for flowing the first coating gas into the coating retort in contact with a source of a reactive element inside the retort to convert a portion of the first coating gas to a halide coating gas of the gettering element that contacts a substrate in the retort with the first coating gas to codeposit the metal and the reactive element on the substrate.

24. The apparatus of Claim 23 including a secondary source of the metal upstream of the reactive element source for contacting the unconverted portion of the first coating gas.

25. The apparatus of Claim 24 including means for introducing another metal halide coating gas into the retort upstream of the gettering element source to codeposit said another metal along with said metal and the reactive element on the substrate.